

## A NOTE ON FINGERNAIL GROWTH\*

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Minutiae of growth and the wear and tear inherent in everyday life have escaped the notice of all save the occasional natural historian of disease. Some years ago when looking for facts on nail growth I could find no studies of the long-term growth of fingernails. Therefore, I set about to measure the growth of my fingernails to see whether seasonal or secular trends, sporadic or unpredictable variation occurred. Only recently did other studies come to my notice. This paper sets forth observations made over the past 10 years, and some consideration of recorded observations on the topic.

### METHOD

The rate of fingernail growth may be measured in several ways. First, the nail may be marked with some indelible stain such as nitric acid; second, the nail may be scored with a sharp instrument; and third, clippings from the nail may be measured or weighed. Simplicity recommended the method of scoring the nail sharply with a razor blade exactly where it emerged from beneath the cuticle. Later I used the sharp file commonly employed to open small glass vials. This was done on the first day of every month. The progression of the mark on the nail was then observed as growth took place. The end of the growing space was taken as the region where the nail grew free from its bed. The distance from the starting mark to the free edge was exactly 1.45 centimeters. Throughout the time of observation care was taken not to alter or manipulate the cuticle. There was no change in the length of the nail bed during the 10 year period.

At the commencement of this series of observations, studies were made on all the nails of the left hand, the right thumb and the nails of both great toes. Since there was no great variability in rate of growth of any of the individual nails of the hand, measurement was confined to the nail of the left thumb. Because scoring the toenails was a nuisance I forgot it on several occasions and gave it up. Such observations as were made indicated that the rate was between a quarter and a third as fast as the rate of the thumbnail growth.

As a check on nail growth the distance between scorings was noted; but there was no discrepancy between the linear space so measured and the rate of growth which has been determined by the record of the number of days required for the nail to reach the free edge.

Several measurements were made of nail clippings, both for weight and linear growth. By measuring the distance from the free edge to the cut edge it was found that approximately one third of the nail had been worn away by casual and unnoticed attrition. At various times only 25% was so lost; at others about 50%. Measurement of nail growth by weighing or measuring the terminal clippings thus has a large and uncertain error. It was discarded.

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TABLE I

Number of days required for the mark on the nail to reach the free edge. The mark was made on the first day of the January in the first column, the first of February in the second column, and so on. Numerical averages by season and year are given.

| MONTHS OF GROWING | JAN.-<br>MAY | FEB.-<br>JUNE | MAR.-<br>JULY | APR.-<br>AUG. | MAY.-<br>SEPT. | JUNE-<br>OCT. | JULY-<br>NOV. | AUG.-<br>DEC. | SEPT.-<br>JAN. | OCT.-<br>FEB. | NOV.-<br>MAR. | DEC.-<br>APR. | AVER-<br>AGE |
|-------------------|--------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|--------------|
| 1941              |              |               |               |               |                |               |               |               |                |               | 116           | 113           | 114.5        |
| 1942              | 111          | 115           | 117           | 119           | 118            | 119           | 121           | 116           | 119            | 121           | 118           | 121           | 117.9        |
| 1943              | 122          | 122           | 119           | 120           | 116            | 113           | 116           | 117           | 115            | 118           | 118           | 118           | 117.3        |
| 1944              | 116          | 115           | 116           | 120           | 121            | 117           |               | 123           | 122            | 118           | 116           | 117           | 118.3        |
| 1945              | 115          | 119           | 121           | 125           | 124            | 116           | 117           | 114           | 117            | 119           | 118           | 121           | 118.8        |
| 1946              | 118          | 116           | 118           | 121           | 120            | 122           | 119           | 116           | 118            | 120           | 118           | 120           | 118.8        |
| 1947              | 117          | 117           | 119           | 121           | 120            | 118           | 127           | 128           | 129            | 127           | 123           | 123           | 122.4        |
| 1948              | 123          | 121           | 121           | 123           | 125            | 126           | 126           | 124           | 123            | 124           | 124           | 123           | 123.8        |
| 1949              | 123          | 122           | 122           | 124           | 124            | 122           | 126           | 125           | 125            | 123           | 121           | 122           | 123.3        |
| 1950              | 123          | 125           | 127           | 125           | 128            |               | 128           | 127           | 126            | 123           | 131           | 125           | 126.2        |
| 1951              | 127          | 129           | 128           | 127           | 127            | 123           | 122           | 120           | 121            | 126           | 120           | 123           | 124.4        |
| 1952              | 122          | 120           | 120           |               |                |               |               |               |                |               |               |               |              |
| Average....       | 119.7        | 120.1         | 120.8         | 122.5         | 121.0          | 119.8         | 120.7         | 121.0         | 120.5          | 121.9         | 120.3         | 119.8         |              |

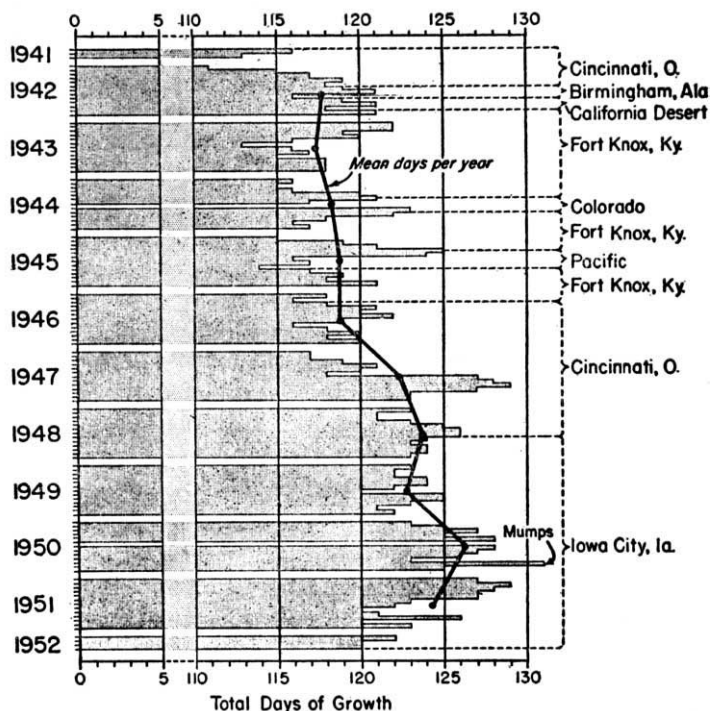


FIG. 1. Nail growth of the left thumb is recorded in days elapsing between the first day of a month when the mark was made and its arrival at the edge of the nail bed. The means for the 12 months are joined by the heavy line. The log of travel indicates location at time initial mark was made in nail. The notation "mumps" shows the delay which occurred in growth indicated by slow progression of mark made November 1, 1950. Two omissions in 1944, 1950, indicate forgetfulness.

## OBSERVATIONS

Many ways of arranging and presenting these simple data are possible. I have recorded them in tabular and graphic form (Table 1 and Figure 1). In Figure 1 the first bar represents the number of days it took for the mark to traverse the entire nail bed (November 1, 1941 to February 24, 1942). Thus each bar represents the days elapsing after the mark was put down on the first of each month until it reached the edge of the nail bed some four months later.

No pattern of seasonal variation was found. There was no regular trend for more rapid growth in summer or slower growth in winter. There were a few unaccountable spurts and lags not associated with change in season. There was no variation of a consistent kind with geographic location, occupation (e.g., Army) or anything else.

A slight but consistent decline in rate of nail growth has been noted. Thus in 1942, at the age of 32, the nail took an average of 117 days to grow the length of the visible nail bed. In 1949, it took 123 and in 1950, 126 days to grow the same distance.

The average rate of growth has varied from extremes of 0.112 mm. daily to 0.132 mm. daily over any measured period. The average for the whole period was 0.119 mm. daily. This method of measuring growth might fail to detect any rapid but short-lived fluctuation in rate but frequent observation throughout the period of study has not revealed any such variability, with the exception of slow or interrupted growth during an attack of mumps.

## DISCUSSION

Since beginning the foregoing observations I have been on the lookout for references to nail growth; and find very little. The earliest observations I have come across were recorded by Weir Mitchell (1) in 1871 under the provocative title "On the Growth of Nails as a Prognostic Indication in Cerebral Paralysis." He was impressed by the transverse serrations and especially the slow growth of the nails on the paralyzed hand in a 56 year old woman under his care for a stroke. This observation led him to stain the nails with nitric acid in two men with hemiplegia he saw soon after the acute episode. In each, the nails of the paralyzed hand failed to grow during the early days; and then suddenly after 12 days in one man and 21 days in the other growth was resumed. Within a week of the return of growth some return of motor power occurred. On the basis of observations on skin temperature and peripheral nerve injury he concluded that a central trophic influence rather than local ischemia was responsible.

Le Gros Clark (2) has summarized our knowledge of nail growth and pointed out the rather large gaps in our understanding which he and his associates have done so much to fill (3, 4). Head and Sherren (5) confirmed the observation of Weir Mitchell that nail growth is retarded when the hand and fingers are paralyzed and added the observation that similar slowing occurs when they are immobilized in a splint or cast. This effect was counteracted and growth was actually accelerated if the hand and fingers were massaged daily. This suggests that

local circulatory changes associated with immobility are responsible for the slowing of nail growth.

Le Gros Clark and Buxton (3) studied the growth of nails in Oxford undergraduates and children in local schools. They found no differences between the rates of growth of the nails of right and left hand regardless of "handedness," or between rates of growth in boys and girls, men and women, or in relation to age in the groups studied. Nail-biters had a very rapid growth, 20 per cent faster than nonbiters, as if to supply the extravagant need. There was a significant and consistent tendency for nails to grow faster in warm weather in all groups studied. The method used by Le Gros Clark, scoring the nail exactly over the lunula, and measuring at set intervals the actual distance the mark advances, gives much more precise data on variations over short periods, whereas the method I used is adequate for average growth only. It does permit extreme or persistent changes to be noted.

Gilchrist and Buxton (4) made a detailed study of the rates of nail growth in relation to nutritional state in children. Poorly nourished children had a rate of growth significantly slower than did those of good nutrition; and the poorly nourished had less variation within the group than did the well nourished.

Absolute rate of growth of nails averaged between 0.105 and 0.125 mm. in summer and between 0.85 and 0.105 mm. in winter in Le Gros Clark's pooled data, with averages of 0.115 and 0.95 mm. per day for the thumbnail.

Lovell (6) recorded a single observation of growth in the moderately clubbed fingers of a 20 year old woman with subacute bacterial endocarditis. The rate was 0.119 mm. a day which was the same as the rate of nail growth of one of his own index fingers (7).

Ronchese (8) in his illuminating contribution to the subject of nail anomalies made no special study of nail growth.

My own observations differ in some regards, from those made by others. Though there have been variations in rate of growth, they followed no distinct seasonal pattern, thus differing from the large collection of measurements made by Le Gros Clark. It is possible that alterations in physical activity may have been responsible. Though this was not seasonal in my case—activity being that of tennis, squash, bicycling, gardening, a tour of duty in the army with much work in a "hot room" testing unit, trips to deserts and tropical regions which introduced enough irregularity into the seasonal pattern to have been noticed had it produced any consistent effect. Since the general rate of growth approximated that found during the Oxford summer it might be argued that with our hot houses in winter we have achieved a virtual homeothermic environment of continual warmth and escape the local effects of coolness and cold.

There were a number of definite but not extreme variations in rate of nail growth which persisted for several months. I could find nothing to account for these waxings and wanings—physical activity, rest, mental exertion or inertia, work or vacation, and perhaps some will be disappointed to know that there was no connection with stages of emotional stress or equanimity.

There was a gradual trend for nail growth to become slower over the decade

of observations; and I see no reason to doubt that this is part of the aging process. It will be of interest to learn whether the rate stabilizes or continues to decline.

The data were adequate for observations to be made during a belated attack of mumps I experienced during the first and second weeks of February 1951. During this month there was a delay of about 7 days in the scored mark reaching the edge of the nail bed. By the next month growth had resumed its previous rate. (Figure 1, Table 1) So far as I am aware, this is the first observation on infection and nail growth. It would be very useful to extend these observations to other infections, chronic as well as acute, and to a whole array of other diseases and processes. I observed no change in association with occasional bouts of "influenza", colds or other minor illness.

#### CONCLUSION

Fingernail growth, studied over a period of 10 years, revealed no seasonal variation but a slight slowing in rate of growth over the period. Average rate of growth has been 0.119 mm. daily with extremes of 0.112 mm. and 0.132 mm.

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